PATENT
Attorney Docket No.: 62888.00001

REMARKS

Claims 1 – 18 were pending. Claims 1 – 18 were rejected. Claims 4, 5, 9, and 18 are being amended. Claims 1 – 18 remain pending. Reconsideration is respectfully requested.

Claim Rejections – 35 U.S.C. §102

The Examiner rejected claims 1 – 10 and 15 – 18 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,974,061 to Byren et al. Applicants traverse.

Claim 1 is patentable over *Byren* by at least reciting:

> A corner-pumping method for slab laser comprising:
> directing a pump light into a laser slab through slab corners of said laser slab;
> propagating the pump light within the laser slab by total internal reflection (TIR); and
> substantially absorbing the pump light during propagating.

In Byren's patent (5,974,061), a laser pump cavity apparatus is disclosed. Byren's patent (5,974,061) only mentioned that a pump light 32 is directed into a laser slab through the entrance surface(s) at the side edges of the pump cavity 34 (refer to Figure 3). Obviously, the **entrance surface** at the side edges of the pump cavity 34 is an end surface of the pump cavity 34, which cannot **corners** of the pump cavity 34.

Thus, the limitation "directing a pump light into a laser slab **through said corners of said laser slab**" is not disclosed or suggested by Byren's patent, and is not obvious at the time the invention was made to a person having ordinary skill in the art.

Further, Byren's patent (5,974,061) described that the incident angle of the pump light after reflecting at the cylindrical surface 18 is decreasing, which will make the total internal reflection (TIR) condition finally not satisfied, so the pump light trapping within the slab is primarily due to high reflectivity coating on the cylindrical surface 18, but not the total internal reflection (TIR) (refer to col. 3, lines 40-41; col. 4, lines 10-15 therein). Further, it can be seen from the specification and the drawings that the **laser beam** (not the pump beam) is total internal reflected within the laser slab (refer to col. 4, lines 55-59 therein and figure 4).

While in the claimed invention, the incident angle of the pump light after reflecting at the slab inner surface is maintain unchanged, that is, the pump light propagates within the laser slab by total internal reflection (TIR), which makes TIR trapping possible.

In addition, in Byren's patent (5,974,061), the incident angle of the pump light after reflecting at the cylindrical surface 18 is decreasing, which will cause non-uniformity of the absorbed pump power intensity, i.e., the absorbed pump power density in the center doped region is higher than the side doped region, and this non-uniformity is desired in this particular pumping geometry in order to achieve mode matching.

In contrast, in claimed invention, the incident angle of the pump light after reflecting at the slab inner surface is maintain unchanged, and the distribution of the absorbed pump power density is more uniform in the whole doped region, and this uniformity will benefit the laser operation, because the propagation direction of the laser beam in our application is different from that in Byren's patent.

Thus, the claimed limitation of "propagating the **pump light** within the laser slab **by total internal reflection (TIR)**" is not disclosed or suggested by Byren's patent, and is not obvious at the time the invention was made to a person having ordinary skill in the art. Thus, claim 1 is patentable over Byren's patent.

Further, as claims 6 and 15 recite a substantially similar limitation, they are patentable over Byren's patent similarly. Further, the dependent claims are patentable at least by virtue of their dependency.

With respect to claims 4 and 18, as amended, in Byren's patent (5,974,061), the high absorbing efficiency for pump light is achieved through high reflectivity coating on the cylindrical surface 18(col. 4, lines 10-15). In contrast, in the claimed invention the high absorbing efficiency is achieved through total internal reflection (TIR) of pump light inside the laser slab.

With respect to claim 5, as amended, in Byren's patent (5,974,061), the multi-absorption is achieved through high reflectivity coating on the cylindrical surface 18(col. 4, lines 10-15). In contrast, in the claimed invention the multi-absorption is achieved through total internal reflection (TIR) of pump light inside the laser slab.

With respect to claim 9, as amended, in Byren's patent (5,974,061), the cross section of the central portion is rectangular. While in the claimed invention, the cross section of the central portion is **square or circular**.

Claim Rejections – 35 U.S.C. §103

The Examiner rejected claims 11 and 12 under 35 U.S.C. §103 as being unpatentable over Byren in view of U.S. Patent No. 6,865,213 to Perry et al. Applicants submit that claims 11 and 12 are patentable at least by virtue of their dependency to patentable claims.

PATENT
Attorney Docket No.: 62888.00001

The Examiner rejected claims 13 and 14 under 35 U.S.C. §103(a) as being unpatentable over Byren in view of U.S. Patent No. 6,873,639 to Zhang. Applicants submit that claims 13 and 14 are patentable at least by virtue of their dependency to patentable claims.

Further, with respect to claim 13, in Byren's patent (5,974,061), there is only one cylindrical lens (see Fig.1) to collimate the pump light, and there is no lens duct as well. In Zhang's patent (6,873,639), there are two cylindrical lenses **without lens duct**, but the generatrices of these two cylindrical lenses are parallel, but not orthogonal. The usage of these two cylindrical lenses is to form a one-dimensional spatial filter (col. 25, lines 3-8) or a beam expander or reducer (col. 25, lines 8-11) only in the slow-axis plane of the diode bar.

While in the claimed invention, the coupling system including two cylindrical lenses **and a lens duct**, and the generatrices of the two cylindrical lenses **are orthogonal to each other and are parallel to fast axis and slow axis of the diode array**, respectively. The usage of these two cylindrical lenses is to collimate the pump beam both in fast and slow axes of the diode array. After collimating, the lens duct is used to compress and direct the pump beam into the corner surface of the laser slab.

Thus, the limitation of "said coupling system including two cylindrical lenses and a lens duct" and "generatrices of said two cylindrical lenses are orthogonal to each other and are parallel to fast axis and slow axis of said diode array, respectively" are not disclosed or suggested by Byren's patent and Zhang's patent, and are not obvious at the time the invention was made to a person having ordinary skill in the art.

In conclusion, Applicants respectfully submit that all claims are patentable and request a Notice of Allowance be issued. If the Examiner has any questions or needs any additional information, the Examiner is invited to contact the undersigned.

Respectfully submitted,
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